Radiation Effects Research Foundation

—Overview—

The Radiation Effects Research Foundation (RERF) is a binational organization dedicated to the discovery, application, and dissemination of knowledge about health effects among the survivors of the atomic bombings of Hiroshima and Nagasaki. Its two laboratories in Hiroshima and Nagasaki use the most advanced methods of epidemiology, medicine, genetics, molecular biology, and computer science to study radiation-exposed survivors and their offspring. The staff of more than 300 scientists and support staff is predominantly Japanese, supplemented by about a dozen individuals from the United States and elsewhere in the world. The results of RERF research are the primary basis for radiation protection standards throughout the world.

RERF is operated by a binational board of directors (Board), and a binational scientific council (Council) which provides advice to the Board regarding the scientific agenda of RERF.

Annual funding for RERF is provided by the Japanese Government through the Ministry of Health and Welfare (MHW), and by the U.S. Government through the Department of Energy (DOE) -- the latter through an agreement with the National Academy of Sciences (NAS) - National Research Council. Oversight for the U.S. support and the scientific program at RERF resulting from this support is provided by the Research Council's Commission on Life Sciences and the Board on Radiation Effects Research (BRER). The director of BRER is also the study director for the U.S. support of RERF.

The National Research Council serves as an independent advisor to the federal government on scientific and technical questions of national importance. The National Research Council, jointly administered by the NAS, National Academy of Engineering, and the Institute of Medicine, brings the resources of the entire scientific and technical community to bear on national problems through its volunteer advisory committees.

—RERF Departments—

The Department of Epidemiology conducts studies on 120,000 A-bomb survivors primarily with regard to cancer incidence and causes of deaths. The department endeavors to clarify the risks associated with human exposure to ionizing radiation.

The Department of Statistics analyzes interdisciplinary information collected to study radiation effects, lends statistical support and advice to radiation scientists, and assists with data management.

The Department of Clinical Studies conducts biennial health examinations on A-bomb survivors to detect diseases and any radiation-induced health effects. The survivors are informed of all examination results and referred to specialized hospitals when necessary.

The Department of Genetics conducts studies to determine whether there are any increased mutations in children of A-bomb survivors. It also measures chromosome aberrations in the blood cells of the survivors and residual radiation signals in teeth.

The Department of Radiobiology studies radiation effects on the immune system and is responsible for the analysis of cancer cell genes.

The Department of Information Technology is responsible for managing and storing information for use in various studies, maintaining computers, and sending information to world computer networks.

—Research Program—

The research program of RERF is the most comprehensive study of a large, well-defined population exposed to radiation. It includes more than 100,000 people of all ages and both sexes subjected to an instantaneous and wide range of radiation exposures. Several major research foci have evolved over time. These currently include:

- epidemiological studies of cancer incidence and mortality and noncancer morbidity among atomic bomb survivors;
- ongoing clinical follow-up with the collection of biological specimens, longitudinal clinical measurements, and morbidity assessment in a fixed subset of the survivor population; and
- application of modern molecular, cytological, physiological, and other technologies to the unique biological samples provided by the survivors in order to identify radiation-induced changes and to investigate the underlying biological mechanisms of these changes.

As noted in the overview, the results of RERF's epidemiologic studies are the primary basis for radiation protection standards throughout the world.

—RERF Study Populations—

In the 1950 Japanese national census, 284,000 people indicated that they "had been exposed" to the atomic bombings in Hiroshima and Nagasaki. From this group, 200,000 who were residents in Hiroshima or Nagasaki at the time of the bombings were selected as a master sample. From the master sample, a population was selected and was named the Life Span Study (LSS) cohort. The LSS originally included 99,393 persons and was increased to 120,321 by 1980.

In addition to the LSS, other populations under study include: the Adult Health Study (AHS) population, comprising about 20,000 members of the LSS who, since 1958, have been asked to participate in biennial clinic examinations carried out at RERF; the in utero cohort, a group of about 3,000 people who were in utero at the time of the bombings; and the F_1 cohort, consisting of about 80,000 people born in Hiroshima or Nagasaki from 9 months after the bombings until December 1984.

—Elevated-Risk Diseases—

Within several years after the war, A-bomb survivors were found to have a relatively small increased incidence of cataracts and leukemia. The leukemia rate reached its peak 5-10 years after the bombs and decreased thereafter, but some marginal effects still seem to remain. Other cancers, such as those of the stomach and lung, took about 20 years to become apparent. Other than leukemia, the most radiogenic cancers are of the breast and thyroid.

—Effects of In Utero Exposure—

Some exposed while still in their mothers' wombs have experienced brain defects and stunted growth.

—Effects on the Children of Survivors—

DNA studies are being conducted with blood samples from the exposed parents and their children. To date, no increase in mutations, leukemia, or cancer owing to A-bomb radiation exposure to one or both parents has been shown in children of survivors.

—Collaborative Programs—

RERF scientists are actively involved in the interpretation of RERF results with the International Commission on Radiological Protection (ICRP), the United Nations Scientific Committee on the Effects of Atomic Radiation (UNSCEAR), the United Kingdom's National Radiological Protection Board (NRPB), the U.S. National Council on Radiation Protection and Measurements (NCRP), the National Research Council's Biological Effects of Ionizing Radiation (BEIR) studies, and other groups in the interpretation of RERF results. Since the 1986 Chernobyl accident, RERF has become more involved in the studies of radiation effects in other populations whose qualitative exposures differ markedly from atomic-bomb survivors. Recently, RERF has contracted with the U.S. National Cancer Institute (NCI) to provide direct support for efforts to strengthen the epidemiologic studies of workers and members of the general population exposed to radiation as a consequence of plutonium production in the southern Ural Mountains of the Russian Federation.

Additionally, RERF supports 1- to 2-year fellowships enabling scientists from Japan and other countries to visit RERF and participate in the analyses which use this important data resource.

—Future Directions of the RERF—

An international Blue Ribbon Panel consisting of distinguished scientists was appointed by the DOE and MHW in 1995 to assess RERF's current and future scientific activities.

In response to the recommendations outlined in the report, RERF has drafted and begun to implement, with the assistance of NAS, an action plan and a 5-year strategic plan. Among the goals of the plans are development of a new and strengthened peer review process and promotion of stronger collaborations with universities and organizations within Japan and with international organizations.

—For More Information—

Additional information about RERF and email links to contact persons can be obtained through the following home pages:

NAS, Board on Radiation Effects Research–
http://www2.nas.edu/brerhome/

DOE, International Health Programs–
http://www.eh.doe.gov/ihp

RERF–
http://www.rerf.or.jp

or by contacting:

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